

for the stations in New England, 3,626 miles; New Jersey coast, 7,811; Middle Atlantic States, 4,368; South Atlantic States, 4,540; Gulf States, 4,119; Ohio Valley and Tennessee, 2,941; Lower Lake region, 4,985; Upper Lake region, 5,930; the Northwest, 5,138. The following are some of the greatest total movements, viz: Pike's Peak, 11,209 miles; San Francisco, 9,105; Atlantic City, N. J., 8,431; Long Branch, 8,399; Indianola, 7,784; Grand Haven, 6,875; Cheyenne, 6,382; Escanaba, 6,323. Of the least are given Montgomery, 2,683 miles; Louisville, 2,626; Memphis, 2,624; Morgantown, West Va., 2,580; Springfield, Mass., 2,575; Albany, 2,531; Vicksburg, 2,182; Nashville, 2,163; Augusta, 2,159; Knoxville, 2,145; Wytheville, Va., 2,049; Lynchburg, 2,045.

VERIFICATIONS.

Probabilities.—The usual comparison of the "Probabilities," issued tri-daily and covering twenty-four hours from the time of issue, with the conditions following the same, shows that the average verification, for all the districts predicted, is 91.14 per cent. The percentage is greatest for the Upper Lake region, (92.6 per cent.,) and least for New England, (89.4 per cent.) The wind direction predictions have been the most successful, viz: 96.73 per cent. verified; weather, 91.43; temperature, 91.09; barometer, 85.77. The omissions to predict average 0.32 per cent.

Cautionary Signals.—Twenty (20) Canadian stations were notified of the probable approach of storms during the month, but with what result is not known. Out of forty-nine (49) Cautionary Signals, ordered to be displayed at the Signal Service, United States Army, stations on the Lakes and the Atlantic coast, thirty-nine (39) were justified by subsequent dangerous winds either at the station or within a radius of one hundred miles of the same. Three (3) were ordered late. Seven (7) were not justified. Gales were reported to have occurred, for which Cautionary Signals were not ordered, at Wilmington, N. C., on the 2d; over Lake Michigan on the 5th; at Jacksonville, Fla., on the 6th; at Milwaukee on the 10th; over Lake Huron on the 11th; along the New Jersey and southern New England coasts on the 18th; over Lake Michigan on the 20th; along the middle Atlantic coast on the 23d and 24th; on the North Carolina coast during the 25th and 26th.

NAVIGATION.

Upon Chart No. III will be found a table giving the highest and lowest water-marks, with the dates on which they occurred, at the stations along the principal rivers. The Ohio fell almost continuously after the floods during the first part of the month. The Mississippi, at Cairo, had reached the "danger line" during July, but continued rising until the 7th, after which it fell continuously. At Memphis the "danger line" was reached on the 15th, twenty-seven miles below which point it overflowed on the 4th. At Helena it rose above the "danger line" during July, and to its maximum on the 21st instant. At Vicksburg its maximum, on the 24th, was within one inch of the "danger line." The Red river rose slowly and steadily until the 17th, after which it continued falling. The lower Missouri rose during the first week, but generally fell afterwards. Navigation was suspended on the 7th over the Des Moines Rapids at Keokuk, Ia., on account of low water.

TEMPERATURE OF THE WATER.

A table appears on Chart No. II giving the maximum and minimum temperatures of the water, at the bottom, at the different stations along the coast, lakes and rivers.

ATMOSPHERIC ELECTRICITY.

(1.) *Thunder-storms.*—These occurred in at least four States during every day of the month. On the 21st and 23d they were reported as the least frequent, and only from the Southwestern and Northwestern States. The dates upon which they occurred most frequently are the 4th, 5th, 6th, 10th, 13th, 16th and 19th.

Near Freehold, N. J., upon the 7th, while the sky was clear overhead with clouds in the northwest, and heavy shower in the southeast, discharges of electricity took place from the latter to the former, and a barn was struck by lightning and consumed.

(2.) *Auroras*.—The only auroras reported to have been seen were at Memphis on the 7th, Buffalo on the 9th, and Santa Fé, N. M., on the 23d.

OPTICAL PHENOMENA.

(1.) *Solar Halos*.—These were most frequently observed on the 1st and 2nd, in advance of the low barometer, No. I, in Michigan, Pennsylvania, New York, Massachusetts, New Hampshire, Vermont and Maine. They were seen in one or more States upon every day, except the 3rd, 4th and 16th; in Delaware, New Hampshire, New York and Connecticut, the 10th; in Massachusetts, New Jersey, Mississippi and Louisiana, the 19th; in Maine, New Hampshire, New York, Ohio and Wisconsin, the 23rd.

(2.) *Lunar Halos* are reported to have been seen in Illinois, Ohio, New Jersey, Massachusetts and Maine, on the 10th; in Kansas, Wisconsin, Texas, North Carolina and Rhode Island, on the 12th; in Maine, Virginia, North Carolina, Georgia and Illinois, on the 13th; in Massachusetts, Rhode Island, New York, Wisconsin, Iowa, Missouri, Kansas and Nebraska, on the 14th. During the first and last parts of the month very few were observed.

(3.) *Mirage*.—On the 1st, at Fort Niagara, N. Y.; 2nd, Pt. Pleasant, La.; 4th, 10th, 16th and 19th, at Atlanta, Kan.; 16th, at Ellinwood, Kansas.

MISCELLANEOUS PHENOMENA.

(1.) *Zoological*.—*Grasshoppers* were reported numerous at Cheyenne, W. T., on the 6th, 8th, 23d, and 24th; at Denver, C. T., from the 8th to the 14th, 19th to 28th, 30 and 31st; at Ellinwood, Kan., on the 18th; near Las Vegas, N. M., on the 26th. *Colorado Beetle* at Manitowoe, Wis., up to the 22d; at Atco, N. J., and Brookhaven, N. Y., destroying vegetation. *Winged Ants* at Kensico, N. Y., on the 29th. *Martins* left Independence, Iowa, on the 20th; Jacksonville, Ohio, on the 14th.

(2.) *Forest fires* southeast of Marquette, Mich., on the 3d.

(3.) *Meteors* were noticed least frequently about the middle of the month. They were seen on the 5th in Iowa, Minnesota, Missouri, Nebraska, Louisiana, Tennessee, Virginia, and New York; the 6th in Illinois, Indiana, Iowa, Nebraska, Missouri, Minnesota, and Mississippi; the 10th in Iowa, Missouri, Indiana, Louisiana, New York, and Rhode Island; the 12th in Dakota, Iowa, Illinois, Indiana, Louisiana, and New Jersey.

(4.) *Earthquakes* at El Monte, Cal., hummings on the 4th, and rumbles on the 24th.

(5.) *Zodiacal lights* at Fall River Mass., on the 27th; at Burlington, Iowa, 30th and 31st.

(6.) *Lunar rainbows* at Mason City, Ia., on the 9th; Leesburgh, Ind., 10th; Gardiner, Me., 13th; Brook Haven, Miss., 18th.

(7.) At Marquette, Mich., a comparison of the changes in the barometer, with those in the surface of the water in the lake, from tri-daily observations, shows that they acted in a contrary manner sixty-six (66) times, and together twenty-seven (27) times.

PUBLISHED BY ORDER OF THE HON. WM. W. BELKNAP, SECRETARY OF WAR.

Albert J. Myer

Brig. Gen. (Bot. Assg^t.) Chief Signal Officer, U. S. A.

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